



Fermilab

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Jon Kotcher
D0
MS 357

Pat Lukens
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MS 318

Dear Jon and Pat,

Thank you for the presentations on D0 and CDF at the recent meeting of the Physics Advisory Committee (PAC). The Committee had the following comments:

The Committee congratulates the CDF and D0 collaborations for the excellent progress they have made since our last meeting in developing their upgrade plans and preparing detailed Technical Design Reports. The Committee especially recognizes the successful efforts of the Joint Silicon Task Force to coordinate the collaborations' silicon design activities. As the projects move into prototyping and construction, this coordination and resource-sharing should continue. The Committee also welcomes the establishment by the Laboratory of a standing Technical Review Committee (TRC) for the Run IIb upgrade projects. The TRC will hold its first meeting in December.

The Committee notes that the most critical factor in assuring the success of the Run II physics program is achieving the luminosity goal of 15 fb^{-1} . This must be the first priority in the allocation of Laboratory resources and effort. The Committee applauds those CDF and D0 collaborators who have become involved in the accelerator project and encourages an even higher level of participation.

The Laboratory will provide the CDF and D0 collaborations with specific guidance on the Fermilab resources that will be available for the RunIIb upgrades. Those resources, both M&S funds and Fermilab personnel, will be substantially less than were assumed in the proposals. This will be especially true during the first two years.

For the initial TRC review in December the collaborations will be expected to present re-optimized proposals that are compatible with the specified resources and funding profiles.

These updated proposals must include realistic resource-loaded schedules. There must be adequate contingencies for costs, schedules and personnel. CDF is especially encouraged to increase contingency allowances above those specified in their TDR. Following the successful completion of the initial TRC review the Committee expects that the projects will be baselined and the detector designs frozen as soon as is practical.

Given the constraints on available resources, it will not be possible to maintain optimal detector capabilities for the full suite of physics targets that are potentially available in Run IIb. In evaluating upgrade options the exclusive criterion should be their effectiveness for the Higgs search, especially in the main channels $WH \rightarrow \ell \nu b \bar{b}$ and $ZH \rightarrow \nu \bar{\nu} b \bar{b}$. In their presentations to the TRC, the collaborations must justify all of the components of their proposed upgrades in terms of Higgs sensitivity, using explicit units of effective gains or losses in integrated luminosity for the Higgs search.

As has already been indicated, the silicon detectors that have been proposed are very ambitious and are clearly beyond the bounds of available resources. The Committee expects that necessary cost and manpower reductions will be achieved through major modifications to the designs, including the elimination of one or more silicon layers or increasing strip pitch. A benefit of the modular designs of the current detector proposals is that the structure of the reworked design is likely to be very similar. The aggressive start on prototyping of sensors, hybrids, chips and staves is an excellent sign of progress, and work on critical components should continue even before the designs are finalized. The Committee recommends that the Laboratory provide the financial and manpower support required for the collaborations to build and test working prototype staves and other critical-path items as soon as possible.

New guidance on the target date for silicon completion will be provided by the Laboratory. Additionally, the transition to 132-ns Tevatron running should occur when the rate of interactions per crossing compromises the performance of the detectors, which is expected to occur at a luminosity of $\sim 2 \times 10^{32}$. To maximize integrated luminosity it would be advantageous for the switch to 132-ns to coincide with the shutdown for the silicon replacements.

While the silicon upgrades are the principal detector challenge in assuring the success of Run IIb, a number of the other proposed improvements may also be essential. The Committee recognizes that the D0 triggers need substantial modifications to retain sensitivity to interesting Higgs channels once the luminosity is much higher than 10^{32} . The Laboratory should provide the required support to ensure that the implementation of these remedies is matched to the schedule for luminosity improvements. The Committee strongly encourages the D0 collaboration to concentrate on those items that are essential for Higgs sensitivity.

The proposed CDF upgrades other than silicon should be carefully scrutinized to assess their impact on Higgs physics and to ensure that they do not unnecessarily divert effort from critical tasks. The removal of the projective COT project from the list of upgrades being actively pursued is welcomed by the Committee. The quantitative physics cases have not yet been made for the Central Preradiator, CSX replacement or the 3-D XFT trigger. The Committee strongly encourages the CDF collaboration to concentrate its efforts on the silicon project.

I share the PAC's comments and concerns, and accept their recommendations. We should get together very soon to discuss the level of funding that will be available to you, in order for you to prepare a re-optimized proposal for presentation to the Technical Review Committee in early December.

Sincerely,

Michael Witherell

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